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ORIGINAL ARTICLE

Three-year and five-year outcomes of surgical resection for pancreatic ductal adenocarcinoma: Long-term experiences in one medical center

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KEYWORDS
outcomes;
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Summary *Objective:* Pancreatic ductal adenocarcinoma is one of the most malignant types of cancer. This study evaluated the 3-year and 5-year surgical outcomes associated with the cancer and determined whether statistically identified factors can be used to predict survival.
Methods: This retrospective review was conducted from 1995 to 2010. Patients who had resectable pancreatic ductal adenocarcinoma and received surgical treatment were included. Cases of hospital mortality were excluded. The relationships between several clinicopathological factors and the survival rate were analyzed.
Results: A total of 223 patients were included in this study. The 3-year and 5-year survival rates were 21.4% and 10.1%, respectively, and the median survival was 16.1 months. Tumor size, N status, and resection margins were independent predictive factors for 3-year survival. Tumor size independently predicted 5-year survival.
Conclusion: Tumor size is the most important independent prognostic factor for 3-year and 5-year survival. Lymph node status and the resection margins also independently affected the 3-year survival. These patient outcomes might be improved by early diagnosis and radical resection. Future studies should focus on the tumor biology of this aggressive cancer.

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1. Introduction

Pancreatic ductal adenocarcinoma comprises 90% of pancreatic cancers. Most patients with pancreatic ductal adenocarcinoma are diagnosed at an advanced stage, and the overall survival rate is low. Various treatment options are available, but only radical surgical resection can provide a chance for a cure in patients with this disease.[1,2] Moreover, due to the aggressive nature of the disease, recurrence within 1 year after surgery might also be inevitable for many patients. The 5-year survival rate of these patients undergoing surgical resection has been reported to range from 6.8% to 32%.[1–26]

Due to disappointing treatment results, researchers worldwide have attempted to determine the most important prognostic factors that affect survival. Additionally, several prognostic factors that influence survival following surgical resection have been identified using various statistical methods, including univariate, multivariate, and survival analyses.[2–5,7,8,10–17,19–28] However, there is no consensus regarding these factors due to variable results, and the most important factors that contribute to the postoperative long-term survival of patients with pancreatic ductal adenocarcinoma are not fully understood. Most of the current literature has focused on prognostic factors for 5-year survival. However, the median survival time for patients who undergo surgical resection for pancreatic ductal adenocarcinoma is only between 7 months and 33 months.[1–3,8,11,12,14,16,19,21,22,27,29–31] In the present study, we describe our long-term experience at a single institution and various clinicopathological characteristics to analyze the prognostic factors of 5-year and 3-year survival for patients who underwent surgical resection for pancreatic ductal adenocarcinoma. Furthermore, we aimed to determine whether statistically identified prognostic factors can be used to predict 3-year and 5-year survival.

2. Methods

We retrospectively reviewed the records of patients with pancreatic ductal adenocarcinoma who underwent surgical resection between January 1995 and December 2010 at the Chang Gung Memorial Hospital, Taiwan. Excluding 14 patients with hospital mortality, a total of 223 patients were included. All medical records were individually reviewed. The follow-up duration was measured from the time of surgery until death or the last follow-up examination. The clinicopathological data extracted from the medical records included the following information: age, gender, symptoms, physical findings, laboratory data, type of operation, tumor size, tumor location, tumor differentiation, stage, resection margins, vascular invasion, lymphatic invasion, perineural invasion, complications, use of chemotherapy, and use of radiotherapy. This study was approved by the Institutional Review Board of Chang Gung Memorial Hospital (No. 104-4010C).

2.1. Treatment protocols

Patients with a pancreatic mass or suspicion of pancreatic cancer underwent a surgical consultation for diagnosis and therapy. Preoperative evaluations of laboratory data included analyses of carcinoembryonic antigen (CEA) and carbohydrate antigen (CA) 19-9. An abdominal computed tomography (CT) scan with contrast was then obtained. If no mass was observed on the CT scan but clinical suspicion remained high, magnetic resonance cholangiopancreatography (MRCP) or endoscopic retrograde cholangiopancreatography (ERCP) was indicated. In selected cases, endoscopic ultrasound may identify tumors that cannot be seen on a CT scan, MRCP, or ERCP. The imaging findings were then used to stage the pancreatic cancer and determine whether a patient had a resectable tumor. The disease stage in this study was defined according to the seventh edition of the tumor—node—metastasis classification proposed by the American Joint Committee on Cancer (AJCC).[32] Laparoscopy may be useful for the identification of patients with small metastatic hepatic and/or peritoneal implants for whom further surgery may be avoided.

For resectable tumors in the head of the pancreas, the standard treatment is pancreaticoduodenectomy. Distal pancreatectomy with splenectomy is the procedure of choice for tumors of the body or tail of the pancreas. For patients with obstructive symptoms, including biliary or duodenal obstruction secondary to a pancreatic head mass, preoperative histological confirmation is not essential prior to surgical intervention. Suitable patients received chemotherapy with fluoropyrimidine-based regimen (tegafur, 5-FU or S1), gemcitabine alone, gemcitabine plus cisplatin or gencitabine plus S1 6—8 weeks after surgery. External-beam radiotherapy coupled with gemcitabine, 5-fluorouracil, or other alternatives is considered for selected patients following resection with positive margins. Intraoperative radiotherapy is another alternative. All of the patients included in this study received general supportive care after the procedures, and admission to the intensive care unit was arranged according to the patients' surgical risks and other unexpected intraoperative conditions. If complications were suspected clinically or on the basis of radiographic findings, further CT scans were conducted before any interventional procedure was performed. In-hospital mortality was defined as death occurring after surgery prior to discharge.

2.2. Follow-up study

The median follow-up time was 14.8 months. The follow-up evaluation included clinical physical examinations and blood chemistry tests; both of which were performed at each clinic visit. Additionally, every 3 months, serum CEA and CA 19-9 levels were measured, and the liver was examined by abdominal ultrasonography (US). If abdominal US revealed a new lesion or elevated CEA or CA 19-9 levels were noted, abdominal CT with contrast was performed. If any of the above examinations indicated possible recurrence, the patient was admitted for comprehensive assessments. The methods used for treating recurrence included palliative surgery, systemic chemotherapy, external-beam radiotherapy, endoscopic stenting, and conservative treatment, as appropriate.

2.3. Statistical analysis

Baseline characteristics of the two outcome groups were compared using Pearson χ^2 or Fisher exact tests for

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